

Remarks

The present amendment responds to the Official Action dated August 11, 2003. In the Official Action, claims 12 and 13 were withdrawn pursuant to an election requirement. Claims 1 and 14 were rejected under 35 U.S.C. 102(b) based on Hamada, Japanese Patent No. JP406174961A (Hamada). Claims 14-16, 19 and 20 were rejected under U.S.C. 102(b) based on Sugizaki, Japanese Published Patent Application No. 08-190030 (Sugizaki). Claims 2, 3, 6, 7, 17 and 18 were rejected under 35 U.S.C. 103(a) based on Hamada. Claims 1, 4, 5, 8-11, 14-16, 19 and 20 were rejected under 35 U.S.C. 103(a) based on Sugizaki in view of Hamada. These grounds of rejection are addressed below following a brief discussion of the present invention to provide context. Claims 1, 8, 14, and 19 have been amended to be more clear and distinct. Claims 1-11 and 14-20 are presently pending.

The Present Invention

As discussed in the specification, the problem of splice loss is of critical importance in the optical fiber industry. Two factors have contributed to the importance of the issue of splice loss. First, as optical transmission lines increase in length, the number of splices in the line tends to increase, thereby increasing total splice loss. Also, newer optical fibers have displayed increased splice loss, using older splicing methods. One reason for this is that newer optical fibers, such as dispersion compensating fiber, include relatively high concentrations of fluorine dopant. Because of its physical properties, fluorine tends to diffuse at a significantly faster rate than other dopants, leading to increased splice loss.

One insight made by the inventor of the present invention is that the amount of splice loss could be reduced by heating a splice to a predetermined maximum temperature and then cooling the splice from the maximum temperature down to room temperature using a predetermined cooling ramp. It was discovered that optimal splice loss reduction could be achieved by optimizing the maximum temperature and the cooling ramp profile. As set forth in the specification, this optimization may be achieved, for example, by conducting a series of trial splices, and measuring the reduction in splice loss for each trial splice. Fig. 12 shows a graph illustrating the results obtained from one such series of trial splices.

The Election Requirement

The prior election to prosecute claims 1-11 and 14-20 is hereby affirmed. Accordingly, claims 12 and 13 are canceled without prejudice.

The Art Rejections

I. Rejection of Claims 1 and 14 under 35 U.S.C. 102(b)

Claims 1 and 14 stand rejected under 35 U.S.C. 102(b) based on Hamada. As amended, claims 1 and 14 are directed to a method that specifically includes varying an electric arc current over time to create a ramp in temperature at the splice point from a maximum temperature to room temperature, the maximum temperature and ramp having been optimized to reduce splice loss.

Hamada is directed to a technique in which a cooling ramp is used to increase the mechanical strength of a splice between two optical fibers. However, Hamada utterly fails to mention the critically important issue of splice loss. Hamada's failure to mention splice loss means that Hamada does not teach and does not suggest the present invention. Without the knowledge that a cooling ramp can be used to reduce splice loss, there would be no reason for a practitioner of ordinary skill in the art to vary the electric arc current to achieve an optimal amount of splice loss reduction.

For these reasons, it is asserted that claims 1 and 14 are allowable over Hamada.

II. Rejection of Claims 14-16, 19 and 20 under 35 U.S.C. 102(b)

Claims 14-16, 19 and 20 stand rejected under 35 U.S.C. 102(b) based on Sugizaki.

Claims 14 and 19 are independent claims that are directed to an optical fiber transmission line, in which splice loss has been reduced by varying an electric arc current over time to create a ramp in temperature at the splice point from a maximum temperature to room temperature, the maximum temperature and ramp having been optimized to reduce splice loss.

Sugizaki is directed to an optical transmission line that includes a bridge fiber spliced between first and second transmission fibers. Sugizaki does not teach and does not suggest the use of a cooling ramp to reduce splice loss. It is therefore asserted that claims 14 and 19 are allowable over Sugizaki.

Claims 15 and 16 depend from claim 14, and claim 20 depends from claim 19, including all of the limitations thereof and adding further limitations thereto. It is therefore asserted that

these claims are allowable for the reasons advanced above in support of claims 14 and 19 and further on the basis of the added limitations.

It is noted that the Official Action asserts that claims 14 and 19 are each directed to a "product by process." On that basis, the Official Action states that no weight has been given to the process steps recited in these claims. This legal analysis appears incorrect and is traversed. However, it is asserted that an optical transmission line according to the present invention is distinct, on a molecular level, from an optical transmission line fabricated according to the prior art. As shown in Fig. 12 of the present application, the use of the techniques described in the application leads to a significant reduction in splice loss. This reduction in splice loss occurs because the diffusion of dopants within the splice region differs, on a molecular level, from the diffusion of dopants in splices that have not been subjected to an optimized maximum temperature and cooling ramp. It is therefore asserted that claims 14-16, 19 and 20 are patentable over Sugizaki, regardless of the weight given to the process steps recited in those claims.

It is therefore asserted that claims 14-16, 19 and 20 are allowable over Sugizaki.

III. Rejection of Claims 2, 3, 6, 7, 17 and 18 under 35 U.S.C. 103(a)

Claims 2, 3, 6, 7, 17 and 18 stand rejected under 35 U.S.C. 103(a) based on Hamada.

Claims 2, 3, 6 and 7 depend from claim 1, and claims 17 and 18 depend from claim 14, including all of the limitations thereof and adding further limitations thereto. Thus, claims 2, 3, 6, 7, 17 and 18 each are directed to methods in which splice loss is reduced by varying an electric arc current over time to create a ramp in temperature at the splice point from a maximum

temperature to room temperature, the maximum temperature and ramp having been optimized to reduce splice loss.

As discussed above with respect to claims 1 and 14, Hamada fails to mention the issue of splice loss reduction. It is therefore asserted that claims 2, 3, 6, 7, 17 and 18 are allowable for the reasons advanced above in support of the patentability of claims 1 and 14, and further on the basis of the limitations added by these claims.

For the above reasons, it is asserted that claims 2, 3, 6, 7, 17, and 18 are allowable over Hamada.

IV. Rejection of Claims 1, 4, 5, 8-11, 14-16, 19 and 20 under 35 U.S.C. 103(a)

Claims 1, 4, 5, 8-11, 14-16, 19 and 20 stand rejected under 35 U.S.C. 103(a) over Sugizaki in view of Hamada.

As discussed above, independent claims 1, 8, 14, and 19 are directed to a method for reducing splice loss in which an electric arc current is varied over time to create a ramp in temperature at the splice point from a maximum temperature to room temperature, the maximum temperature and ramp having been optimized to reduce splice loss.

As discussed above, Hamada fails to mention the issue of splice loss. Further, Hamada does not teach and does not suggest the use of a cooling ramp to reduce splice loss. In Sugizaki, the only technique that is taught or suggested to reduce splice is the use of a bridge fiber. Thus, Sugizaki fails to add anything of significance to Hamada. It is therefore asserted that claims 1, 8, 14 and 19 are allowable over Sugizaki and Hamada.

Appl. No. 09/971,875
Amdt. dated November 12, 2003
Reply to Office action of August 11, 2003

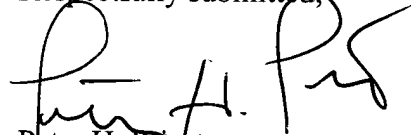
Claims 4 and 5 depend from claim 1, claims 9-11 depend from claim 8, and claims 15 and 16 depend from claim 14, and claim 20 depends from claim 19, incorporating all of the limitations thereof and adding further limitations thereto. It is therefore asserted that claims 4, 5, 9-11, 15, 16, and 20 are allowable for the reasons advanced above in support of claims 1, 8, 14, and 19, and further on the basis of the added limitations.

It is therefore asserted that claims 1, 4, 5, 8-11, 14-16, 19 and 20 are allowable over Sugizaki and Hamada.

Conclusion

All of the presently pending claims, as amended, appearing to define over the applied references, withdrawal of the present rejection and prompt allowance are requested.

Respectfully submitted,



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